**Center Independent Research & Development: GSFC IRAD**

# Reaction Wheel for Sounding Rocket Payload Attitude Control

Completed Technology Project (2017 - 2019)

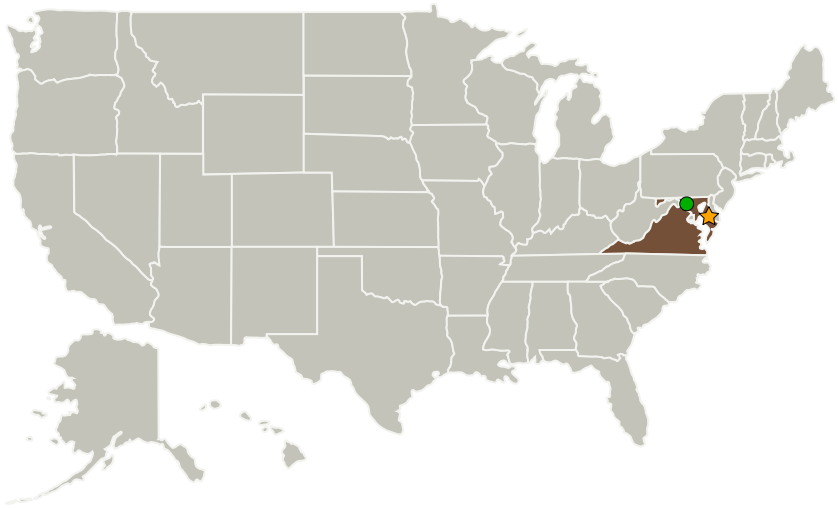
## Project Introduction

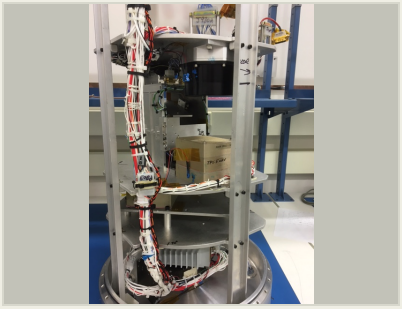
Sounding rocket payload attitude is currently controlled by a system of cold gas thrusters. The gas released by the thrusters has the potential to interfere with science instruments that make measurements of the local environment. There is interest in the sounding rocket science community in an attitude control system (ACS) that can provide fine attitude control without releasing gas. A three-axis reaction wheel assembly (RWA) control system has been modeled that could provide gasless attitude control for sounding rocket payloads. During development of the three-axis model, it was revealed that reaction wheels designed for orbital spacecraft are not well suited for sounding rocket applications. The goal of this project is to design a reaction wheel specifically for use in a sounding rocket ACS.

## Anticipated Benefits

- Providing an option for a gasless ACS will improve the quality of science data capable of being captured during a sounding rocket flight.
- Finer attitude control can be provided using reaction wheels than through a pulsed cold gas system.
- Improving sounding rocket capabilities would increase the number of experiments for which sounding rockets could be used as a platform.

## Primary U.S. Work Locations and Key Partners





The wheel used for the roll control proof of concept flight is shown mounted in the carrier.

## Table of Contents

# Reaction Wheel for Sounding Rocket Payload Attitude Control

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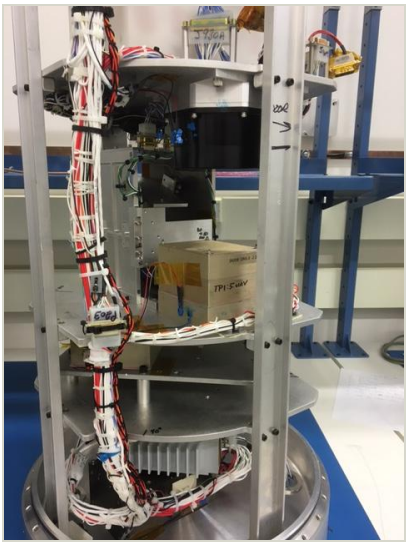
| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Wallops Flight Facility(WFF) | Lead Organization | NASA Facility | Wallops Island, Virginia |
| ●Goddard Space Flight Center(GSFC) | Supporting Organization | NASA Center | Greenbelt, Maryland |

| Primary U.S. Work Locations | |
|---|---|
| Maryland | Virginia |

## Images



**Proof of concept roll controller wheel**
The wheel used for the roll control proof of concept flight is shown mounted in the carrier.
*(https://techport.nasa.gov/image/34364)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Mission Support Directorate (MSD)

**Lead Center / Facility:**
Wallops Flight Facility (WFF)

**Responsible Program:**
Center Independent Research & Development: GSFC IRAD

## Project Management

**Program Manager:**
Peter M Hughes

**Project Managers:**
Daniel A Mullinix
Michael G Hitch

**Principal Investigator:**
Zachary W Peterson

**Co-Investigators:**
Quinn A Jackson
Kenneth E Hall

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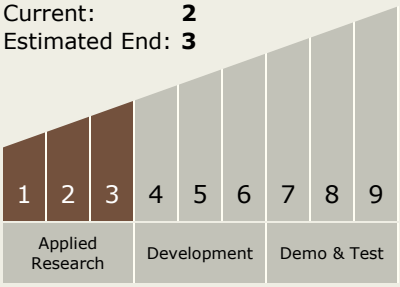
## Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **3**




## Technology Areas

**Primary:**

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

## Target Destination

Earth